Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EC304

Course Name: VLSI

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks Marks

1 a) How electronic grade silicon is prepared from raw SiO_2? (5)

b) Illustrate the dry and wet oxidation technique used in IC fabrication with schematic diagram. (10)

2 a) With the help of mathematical equations, explain the distribution of impurities in a semiconductor in ion implantation process. (10)

b) Phosphorous is implanted in a p-type silicon sample with a uniform doping concentration of 5×10^{16} atoms per cm^3. If the beam current density is 2.5μA per cm^2 and the implantation time is 8 minutes, calculate the implantation dose and peak impurity concentration. Assume $\Delta Rp=0.3\mu m$ (5)

3 a) Explain N-well CMOS IC fabrication sequence with the help of neat diagrams. (10)

b) Explain one method of fabrication of capacitor structure in integrated circuits. (5)

PART B

Answer any two full questions, each carries 15 marks

4 a) Explain the various types of power dissipation in CMOS inverter? Derive the expression for total power consumption of a CMOS inverter. (10)

b) Why PMOS transistor can pass only strong ones and NMOS can pass strong zeros. (5)

5 a) Draw the circuit diagram and layout of a two input CMOS NAND gate. (10)

b) Implement the function u = A'B+AB' and v = AB+A'B' using complementary pass transistor logic. (5)

6 a) Explain the structure and working of a transmission gate. Implement 4×1 multiplexer using transmission gates. (10)

b) Implement the function f = [AB + C (DE+F)]' using static CMOS logic. (5)

PART C

Answer any two full questions, each carries 20 marks

7 a) Explain the read and write operation of a six transistor CMOS SRAM cell. (10)

b) What is FPGA? Explain its constructional details with diagram. What are the advantages of FPGA? (10)

8 a) Design a 4-bit × 4-bit NOR-based ROM array and explain its working. (10)

b) Explain the read and write operation of a three-transistor DRAM cell. (10)

9 a) Explain the working a 16-bit carry-by pass adder and write down the expression (10)

for worst-case delay.

b) Explain 4×4 bit-array multiplier with block diagram. (10)

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